

FLEXNER LECTURERS AT VANDERBILT

1928 Heinrich Poll	1970 Franz Gross
1931 Sir William Bate Hardy	1971 Philip Sandblom
1933 Francis Richard Fraser	1974 George Klein
1935 Gunnar Nystrom	1975 Burton O. Burton-Bradley
1937 Thorvald Madsen	1980 C. David Marsden
1939 Albert V. Szent-Gyorgyi	1983 John Lister
1942 Warfield T. Longcope	1986 Richard D. Palmiter
1942 Donald D. van Slyke	1988 Michael B. A. Oldstone
1945 H. J. Curtis	1989 Michael J. Berridge
1945 Oliver H. Lowry	1990 Irwin J. Kopin
1945 Robert F. Pitts	1991 Harold E. Varmus
1945 H.A. Blair	1992 Max Dale Cooper
1947 Sir Edward Mellanby	1993 Thomas Maniatis
1949 Arvid Wallgren	1994 Philip Leder
1953 Hans Ludwig Kottmeir	1995 Stanley B. Prusiner
1955 Willi Hoffer	1997 Johann (Hans) Deisenhofer
1956 J. Harold Burn	1998 Robert B. Salter
1958 Sir Macfarland Burnet	1999 Keith R. Yamamoto
1965 Jan Gosta Waldenstrom	2010 Thomas Cech
1968 J.Z. Young	2012 Eric Wieschaus



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THE DEPARTMENT OF CELL AND DEVELOPMENTAL BIOLOGY
DISTINGUISHED FACULTY LECTURE
AND
THE EPITHELIAL BIOLOGY CENTER

ABRAHAM FLEXNER LECTURE IN BIOMEDICAL SCIENCE

ERIC WIESCHAUS, PH.D.

MECHANICS OF CELL SHAPE CHANGE IN DROSOPHILA

MARCH 8, 2012

4:00 P.M.

208 LIGHT HALL

Upcoming Discovery Lecturers

GAIL MARTIN, PH.D.

University California San Francisco

April 12, 2012

208 Light Hall / 4:00 P.M.

JIM WELLS, PH.D.

University California San Francisco

April 26, 2012

208 Light Hall / 4:00 P.M.

VANDERBILT  UNIVERSITY
MEDICAL CENTER

MECHANICS OF CELL SHAPE CHANGE IN DROSOPHILA

How cells convert patterns of gene activity into the physical properties that control shape and motility is a major question in biology. In my talk I will describe recent experiments that address these questions using the *Drosophila* embryo as a model system. Cells in the ventral region of this embryo are assigned to the mesodermal cell fate by two transcription factors, Twist and Snail. These cell fate decisions are followed by immediate changes in cell shape that internalize the mesoderm.

Our experiments have identified a novel pulsating reorganization of the Actin/Myosin cytoskeleton that arises in the apical region of these cells. We have characterized this reorganization using computational tools that allow tracking of the physical properties of all 800 mesodermal cells during gastrulation. Our experiments show that cell shape changes and nuclear position are pulsed in synchrony with the Actin/Myosin contractions in the apical surface. We envision that force generated apically is transmitted over large distances by the non-compressible nature of the cytoplasm.

Surprisingly, many of the morphological changes in mesodermal cells still occur in mutants in which cellularization has been blocked. We investigate the properties of the cytoplasm that transmit force in the absence of membrane by tracking fluorescent beads in living embryos and locally disrupting the cytoskeleton using laser dissections.

THE ABRAHAM FLEXNER LECTURE IN BIOMEDICAL SCIENCE

The Abraham Flexner lectures were established at Vanderbilt in 1927 by Bernard Flexner, a New York attorney who gave \$50,000 to endow a lectureship in honor of his brother. At that time Abraham Flexner was one of America's most authoritative figures in medical education. He had written a 1910 report sponsored by the Carnegie Foundation which resulted in nationwide reform of medical schools, he was an official of Rockefeller's General Education Board for more than fifteen years, and he was the first Director of Princeton's Institute for Advanced Study. Abraham Flexner himself selected Vanderbilt as the university in which the lectures honoring him should be given, stating "My work at Vanderbilt University is perhaps more satisfactory than at any other place..."



The first Abraham Flexner Lecture was given in the 1928-29 academic year. The endowed fund has been used through the years to secure an eminent physician or scientist as a lecturer in residence.

Please see full list of lecturers on back panel.



ERIC WIESCHAUS, PH.D.

**SQUIBB PROFESSOR, DEPARTMENT OF MOLECULAR BIOLOGY
PRINCETON UNIVERSITY**

NOBEL PRIZE, PHYSIOLOGY 1995

HOWARD HUGHES MEDICAL INSTITUTE INVESTIGATOR

MEMBER, NATIONAL ACADEMY OF SCIENCES

In the late 1970s, Eric Wieschaus and Christiane Nüsslein-Volhard carried out large-scale mutagenesis screens to identify genes controlling embryonic development in *Drosophila*. In contrast to previous genetic analyses, these screens were designed for genomic saturation, i.e. identifying key components in all pathways that govern gross morphology, patterning and differentiation. These experiments established a basic "tool box" of maternal factors and signaling pathways that operate in the *Drosophila* embryo and are in fact conserved with remarkable fidelity in all multicellular organisms. Mutations in the associated genes account for a significant fraction of inherited birth defects in humans and play a major role in cancer. Wieschaus and collaborators then went on to elucidate basic features of the Wnt pathway, showing, for example, that Wnt signaling modulates levels and nuclear localization of beta-catenin (=Armadillo) and investigating the role of GSK3 β and APC in that process. More recent work has focused on the cell biological mechanisms that control cell shape change and movement during gastrulation, and on quantitative biophysical measurements of morphogen gradients during early development. Wieschaus is a HHMI investigator, a member of the National Academy of Sciences (USA), a foreign member of the Max Planck Society, and the 1995 Nobel Laureate for Medicine.

The Cell and Developmental Biology Distinguished Faculty Lecture Series is an annual event in honor of the more than 80 years of excellence in research, teaching and service by the faculty of Vanderbilt University School of Medicine in the Cell and Developmental Biology Department.

CELL AND DEVELOPMENTAL BIOLOGY PRIMARY FACULTY

(based on the faculty census from 1985 onward)

James W. Ward, M.D., Professor Emeritus%	1958-1993
Jack Davies, M.D., Professor Emeritus%	1963-1991
G. Rodman Davenport, Ph.D., Associate Professor%	1963-1993
Alvin M. Burt, Ph.D., Professor Emeritus	1966-2000
Loren H. Hoffiman, Ph.D., Professor%	1969-1999
John A. Freeman, M.D., Ph.D., Professor	1971-1994
Vivien A. Casagrande, Ph.D., Professor	1975-present
James A. McKanna, Ph.D., Associate Professor Emeritus	1976-2002
Gary E. Olson, Ph.D., Professor	1977-2008
Alfred G. Kasselberg, M.D., J.D., Assistant Professor	1978-2001
Jeanette J. Norden, Ph.D., Professor	1978-present
Paula C. Hoos, Ph.D., Associate Professor	1982-1997
Harold L. Moses, M.D., Professor	1985-2000*+
W. Jackson Pledger, Ph.D., Professor	1985-1994
Edward B. Leof, Ph.D., Associate Professor	1985-1992
Lynn M. Matrisian, Ph.D., Professor	1986-2000
Stephen R. Hann, Ph.D., Professor	1986-present
Jeffrey T. Holt, M.D., Professor	1987-2002
Brigid L.M. Hogan, Ph.D., FRS, Professor	1988-2002
J. Ann Richmond, Ph.D., Professor	1989-2000+
Christopher V.E. Wright, D.Phil., Professor	1990-present
Bruce W. Ennis, Ph.D., Assistant Professor	1990-1993
Steven K. Hanks, Ph.D., Professor Emeritus	1990-2011
Susan R. Fox, Ph.D., Assistant Professor	1990-1993
Kathleen L. Gould, Ph.D., Professor	1991-present
Claude M. Nagamine, Ph.D., Assistant Professor	1991-2000
Mary Ann Arildsen, M.D., Ph.D., Assistant Professor	1991-1998^
David M. Miller, Ph.D., Professor	1994-present
David I. Greenstein, Ph.D., Associate Professor	1994-2006
Peng Liang, Ph.D., Associate Professor	1995-2000
Peter A. Kolodziej, Ph.D., Assistant Professor%	1995-2005
Albert B. Reynolds, Ph.D., Professor	1996-2000+
David W. Threadgill, Ph.D., Assistant Professor	1996-2000
Chin Chiang, Ph.D., Professor	1997-present
Arthur F. Dalley, Ph.D., Professor	1998-present
Christopher F.J. Hardy, Ph.D., Associate Professor	2002-2009
Susan R. Wentz, Ph.D., Professor & Interim Chair	2002-present
Daniela Drummond-Barbosa, Ph.D., Assistant Professor	2002-2009
Guoqiang Gu, Ph.D., Associate Professor	2002-present
Ethan Lee, M.D., Ph.D., Associate Professor	2003-present
Laura A. Lee, M.D., Ph.D., Associate Professor	2003-present
Matthew J. Tyska, Ph.D., Associate Professor	2004-present
Irina N. Kaverina, Ph.D., Associate Professor	2005-present
Byeong J. Cha, Ph.D., Assistant Professor	2005-2009
Stacey S. Huppert, Ph.D., Assistant Professor	2005-present
Patricia A. Labosky, Ph.D., Associate Professor	2006-present
Ryoma Ohi, Ph.D., Assistant Professor	2007-present
Melanie Ohi, Ph.D., Assistant Professor	2007-present
William Tanscy, Ph.D., Professor	2009-present
Andrea Page-McCaw, Ph.D., Associate Professor	2010-present

* Chair of Cell Biology (1985-2000), Emeritus Director, Vanderbilt-Ingram Cancer Center

+ Department of Cancer Biology, VUMC

^ Department of Pathology, VUMC

% Deceased

